# CASE STUDY: Urban Tree Canopy

## The Need

To identify opportunities to help low-income and Environmental Justice households in Gateway Cities reduce energy costs for heating and cooling.

## The Solution

A comprehensive analysis of existing tree canopy cover, preparation of planting plans, and coordinated tree planting in residential neighborhoods of Holyoke, Chelsea, and Fall River.

**Total Project Cost**
$5 million

**Trees Planted**
18,000

**Estimated Households Benefiting**
22,000

**Estimated Annual Household Savings**
$8 million ($2012, at maturity)

**Estimated Total Lifetime Project HVAC Savings**
$700 million

**Estimated Annual Emissions Reduction**
26,000 tonnes $CO_2$ (at maturity)

**Estimated Total Lifetime Project Emissions Reduction**
2.2 million tonnes $CO_2$

**Estimated Jobs Created**
27

**Economic Benefit to MA Economy From Tree Planting**
$11 million

## Holyoke, Chelsea, and Fall River, MA

Mature tree canopy on the neighborhood-scale reduces building energy use for heating and cooling, especially for older, poorly-insulated buildings and in windy areas. Trees also help reduce stormwater runoff. Cities with lower tree canopy have higher energy use, greater water treatment and road infrastructure costs, and lower measures of human health. Because of their history of heavy industry and manufacturing, the mature tree canopy in the Commonwealth's Gateway Cities (the state's 26 smaller formerly industrial cities) is lower than in many other areas of the state, increasing costs in the communities with the least capacity to absorb them. This is particularly true of the Environmental Justice neighborhoods and commercial districts of these Gateway Cities, where the canopy is even lower. Holyoke, Chelsea, and Fall River were chosen for this pilot project because they exemplify the areas that most stand to gain from tree canopy, including housing stock built on average before 1939, high winds, and large Environmental Justice populations.

## Project Summary

The Executive Office of Energy and Environmental Affairs (EEA), in cooperation with the Executive Office of Housing and Economic Development (EOHED), is using Alternative Compliance Payment funds and EEA capital funds to produce comprehensive planting plans for all three cities. These plans include an analysis of existing tree canopy cover and potential plantable area for the entire urbanized area of the cities. A comprehensive assessment of potential tree planting locations and baseline energy usage is being conducted for target neighborhoods. In a cooperative effort between the Cities, three local non-profit organizations (Nuestras Raices (Holyoke), Fall River Street Tree Planting Program, and the Chelsea Collaborative), and the Massachusetts Department of Conservation and Recreation (DCR) Urban Forestry Program, outreach to residents and property owners will be conducted in preparation for planting seasons in spring and fall, 2014. Trees will be planted on private property of owners who desire to participate, at no cost to property owners, by locally-hired crews under the supervision of DCR foresters. Trees will also be planted on public land and rights-of-way. The object of the plantings is to maximize the tree canopy coverage at maturity over the entire area of the target neighborhoods.

## Cooling savings

Tree canopy reduces the amount of energy used to cool buildings by minimizing the absorption of heat by buildings through direct shading, and by reducing the Urban Heat Island effect, lowering overall air temperatures. Every 1% increase in canopy cover is associated with a 1.9% decrease in cooling energy use. This program is projected to reduce costs for the affected households by $100 million ($2012) in cooling costs over the lifetime of the installation, and reduce emissions by 340 thousand tonnes $CO_2$.

## Heating savings

Trees reduce and randomize wintertime wind speeds, thereby reducing the amount of heat loss, especially in old or poorly-insulated buildings. Every 1% increase in canopy cover is associated with a 1.1% decrease. This program is projected to save households $600 million ($2012) in heating costs, and reduce emissions by 1.9 million tonnes $CO_2$.

## Partners

Executive Office of Energy and Environmental Affairs
Executive Office of Housing and Economic Development
City of Chelsea
City of Fall River
City of Holyoke
Chelsea Collaborative
Fall River Street Tree Planting Program
Nuestras Raices
Department of Energy Resources
Department of Conservation and Recreation
USDA Forest Service